

WHAT IS CLAIMED IS:

1. A method for estimating a bottleneck bandwidth used to support estimation of the bottleneck bandwidth between a server and a client in a communication system, the method comprising the steps of:

(a) transmitting a plurality of bursts comprised of packets from said server to said client via a bottleneck link of said system;

(b) computing a set of bandwidth samples from each of said bursts received by said client; and,

(c) determining a best bottleneck bandwidth from said computed bandwidth samples, for the following transmission of data packets from said server to said client.

2. The method of claim 1, further comprising the step of filtering for inaccurate bandwidth samples from said computed bandwidth samples by rejecting bandwidth samples having a sample life time greater than a threshold bandwidth lifetime.

3. The method of claim 1, further comprising the step of filtering for inaccurate bandwidth samples from said computed bandwidth samples by rejecting bandwidth samples encountering an operating system (OS) delay of said client system.

4. The method of claim 3, wherein the bandwidth samples encountering said OS delay is determined based on a quantity difference between an ideal burst duration prior to

encountering said OS delay and an actual burst duration after encountering said OS delay.

5 5. The method of claim 1, further comprising the step of filtering for inaccurate bandwidth samples from said computed bandwidth samples by rejecting bandwidth samples having a retransmitted packet.

10 6. The method of claim 1, wherein the plurality of said packet bursts is transmitted at a maximum speed by said server system so that the inter-packet delay is introduced in each of said bursts.

15 7. The method of claim 1, wherein said new bandwidth corresponds to a median value of said computed bandwidth samples for a low speed link.

20 8. The method of claim 1, wherein said new bandwidth corresponds to the statistical mode of said computed bandwidth samples for a high speed link.

25 9. The method of claim 1, where in said new bandwidth corresponds to a minimum bandwidth of said computed bandwidth samples if a multi-channel link is deployed between said server and said client.

30 10. The method of claim 1, further comprising the step of eliminating bandwidth samples having a missing packet within each of said bursts.

11. The method of claim 1, wherein said bandwidth samples for each of said burst is computed based on a difference between an inter-packet spacing between the first and the last packet within each of said burst.

5 12. A method for estimating a bottleneck bandwidth used to support congestion control between a server and a client, the method comprising the steps of:

(a) transmitting by said server through a bottleneck link a plurality of burst comprised of packets to said client at a maximum rate;

10 (b) computing by said client a set of bandwidth samples for each of said burst packet, said bottleneck bandwidth being a difference between an inter-packet spacing between the first and the last packet within each of said bursts;

(c) filtering said computed bandwidth samples according to predetermined criteria; and,

(d) determining a new bottleneck bandwidth for the following transmission of data packets between said server and said client,

15 wherein determination of said new bottleneck bandwidth is based on said computed bandwidth samples and said and said filtering step.

13. The method of claim 12, wherein the step of computing said bandwidth samples comprises the steps of:

20 determining the start time and the end time of the reception of the first and the last packet within each of said bursts;

determining the packet size of the second packet and the last packet for each of said

bursts; and,

computing said bandwidth samples based on a difference between the packet size of the second packet and the last packet, divided by a difference between an inter-packet spacing duration between the first and the last packet within each of said bursts.

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14. The method of claim 12, wherein the plurality of said packet bursts is transmitted at a maximum rate by said server system so that the inter-packet delay is introduced in each of said bursts.

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15. The method of claim 12, wherein the step of filtering said computed bandwidth samples comprises the step of rejecting bandwidth samples having a sample life time greater than a threshold bandwidth lifetime.

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16. The method of claim 12, wherein the step of filtering said computed bandwidth samples comprises the step of rejecting bandwidth samples encountering an operating system (OS) delay of said client system.

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17. The method of claim 16, wherein the bandwidth samples encountering said OS delay is determined based on a quantity difference between an ideal burst duration prior to encountering said OS delay and an actual burst duration after encountering said OS delay.

18. The method of claim 12, wherein the step of filtering said computed bandwidth samples comprises the step of rejecting bandwidth samples having a retransmitted packet.

19. The method of claim 12, wherein said new bandwidth corresponds to a median
5 value of said computed bandwidth samples for a low speed link.

20. The method of claim 12, wherein said new bandwidth corresponds to the statistical mode of said computed bandwidth samples for a high speed link.

10 21. The method of claim 12, where in said new bandwidth corresponds to a minimum bandwidth of said computed bandwidth samples if a multi-channel link is deployed between said server and said client.

15 22. The method of claim 12, further comprising the step of eliminating bandwidth samples having a missing packet within each of said bursts.

23. A device for estimating a bottleneck bandwidth used to support congestion control between a server and a client, the method comprising the steps of:

means for transmitting plurality of bursts comprised of packets;

20 means for receiving said burst packets via a bottleneck link;

means for generating a set of bandwidth samples based on a difference between an inter-packet spacing between the first and the last packet within each of said bursts; and,

means for determining a new bottleneck bandwidth from said generated bandwidth samples for the following transmission of data packets between said server and said client.

24. The device of claim 23, further comprising a means for filtering said generated bandwidth samples by eliminating one of said generated bandwidth samples exceeding a threshold bandwidth lifetime.

25. The device of claim 23, further comprising a means for filtering said generated bandwidth samples by eliminating one of said generated bandwidth samples encountering an operating system (OS) delay of said client.

26. The device of claim 23, further comprising a means for filtering said generated bandwidth samples by eliminating one of said generated bandwidth samples having a retransmitted packet.